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The Polyporaceae of North America.—V. The Genera Cryptoporus, Piptoporus, Scutiger and Porodiscus

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The most important groups of the genus *Fomes*, as this term is generally used, have been treated in the preceding papers of this series. The plants heretofore considered are, for the most part, perennial, with large stratified sporophores which grow conspicuously upon the dead or dying wood infested by their very active mycelium. The present paper deals chiefly with species found under the genus *Polyporus* in Saccardo. These plants are annual and their fruit-bodies are less conspicuous than those of the former group, while their mycelium is usually comparatively limited in extent. Most of the species here discussed are terrestrial and somewhat fleshy, being allied to the Boletaceae. These terrestrial species are exceedingly rare and beautiful in North America, and present an interesting problem in distribution. The genus *Porodiscus* introduces the wood-loving forms of the genus *Polyporus*, which will form the subject of another article.

CRYPTOPORUS Shear, Bull. Torrey Club, **29**: 450. 1902

The name *Cryptoporus* was first used by Peck (Bull. Torrey Club, **7**: 104. 1880) to designate a new section of the Placodermei made necessary by the discovery of a species of *Polyporus* having a volva. His description of the section is as follows:

"Pileus at first subcarnose, becoming harder or corky, sessile or stipitate, the margins greatly prolonged beyond and beneath the

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mouths of the pores and wholly or partly concealing them from view, generally opening beneath by a small aperture; pores not stratose, the dissepiments thickened at the mouths and there differently colored."

In raising this section to generic rank, Shear cites Peck's description and the description of the single species contained in the section following, with a brief discussion of varieties and several additional collections from new localities.

CRYPTOPORUS VOLVATUS (Peck) Shear

Polyporus volvatus Peck, Rep. N. Y. State Mus. **27**: 98. 1877.
Polyporus obvolutus Berk. & Cooke, Grevillea, **7**: 1. 1878.
Fomes volvatus Cooke, Grevillea, **13**: 119. 1884.
Cryptoporus volvatus Shear, Bull. Torrey Club, **29**: 450. 1902.

This peculiar plant was described from specimens collected on *Abies nigra*. It is also found rarely on *Abies balsamea*, but seems to prefer species of pine, upon which it is quite common. I have seen dead trunks of *Pinus rigida* filled with the mycelium, the fruit bodies emerging through holes made by beetles. It is possible that the specimens found on charred wood in the West are larger than our Eastern plants because no effort is required to reach the surface through a heavy layer of cortex. Torrey's stipitate Western form figured by Gerard is duplicated at times in the East when the plant grows on the top of a log. Henning's variety *Helix* from California is fully described by Peck and differs in no way from the type, which had not been seen when the variety was described. Peck's varieties *obvolutus* and *Torreyi* seem hardly worthy of separation. *P. evolvens* Berk. & Cooke, Herb. Berk. 1879 from California, fastened to a sheet of *P. evolutus* B. & C., is only *P. volvatus* and is very distinct from *P. evolutus*.

EXSICC.: California, *Harkness, Torrey, McClatchie;* Colorado, *Crandall, Shear & Bessey;* Oregon, *Shear, Carpenter;* West Virginia, *Nuttall;* New York, *Murrill;* Michigan, *Robbins;* British Columbia, *Macoun;* Delaware, *Commons;* District of Columbia, *Shear, Hicks*.

PIPTOPORUS Karst. Rev. Myc. **3**: 17. 1881

This genus was originally established upon a single species, *Polyporus betulinus* (Bull.) Fr., and has since remained monotypic.

It is chiefly distinguished from nearly related genera by its separable hymenium, which, upon investigation, is found to be cut off from the context proper by a thin flesh-colored layer of mycelium connected very loosely with the adjacent layers and allowing them to separate easily. In age this layer disintegrates and the tubes fall away in irregular masses, leaving the smooth white surface of the context conspicuously exposed.

PIPTOPORUS SUBEROSUS (L.) Murrill

Boletus suberosus L. Sp. Pl. 1176. 1753.
Boletus betulinus Bull. Herb. France, *pl. 312*. 1786.
Polyporus betulinus Fr. Syst. Myc. **1**: 358. 1821.
Piptoporus betulinus Karst. Rev. Myc. **3**: 17. 1881.
Piptoporus suberosus Murrill, Jour. Myc. **9**: 94. 1903.

Pileus fleshy to corky, compressed ungulate, convex above, plane below, attached by a short umbo behind, varying to bell-shaped when hanging from horizontal trunks, 5–30 × 5–20 × 2–5 cm.; surface smoky, covered with a thin separating pellicle, glabrous, devoid of markings, cracking with age; margin velvety, concolorous, obtuse, projecting beyond the hymenium nearly a centimeter: context fleshy-tough, elastic, homogeneous, 3 cm. thick, milk white; tubes separated from context by a thin pink layer, 0.5 cm. long, 2–3 to a mm., sodden white; mouths very irregular, dissepiments thicker than pores, obtuse, entire, crumbling away in age, leaving the smooth white context: spores white, cylindrical, curved, 4–5 μ in length.

This plant is confined to species of birch, upon the dead or decaying trunks of which it is quite abundant in the northern United States and Canada. Its common occurence in Sweden explains why it was noticed and described by Linnaeus in Flora Suecica as early as 1745. From the following selected exsiccati it will be seen that this species is as cosmopolitan as its hosts. France, *Roumeguère 2102;* Germany, *Sydow 627;* Saxony, *Krieger 907;* Sweden, *Romell 10, Murrill;* Russia, *Jaczewski 76;* Wisconsin, *Baker;* New Jersey, *Murrill;* New York, *Underwood, Murrill;* New Hampshire, *Miss Minns, Grout.*

SCUTIGER Paul. Icon. Champ. *pl. 31. f. 1–3*. 1793

Seven species were included in this genus by Paulet, one of them an agaric, four hydnums and two polypores. The first species

listed and described is *Scutiger tuberosus* Paul., later changed to *Polyporus asperellus* by Leveillé, a well-known European species belonging to the section *Ovini* of Fries and to the genus *Polyporus* of Karsten and *Caloporus* of Quélet. *Albatrellus* of S. F. Gray, another synonym of *Scutiger*, antedates the two last mentioned by more than half a century. Plants belonging to this genus are central-stemmed, fleshy-tough and terrestrial with white flesh, rounded pores and smooth, hyaline spores. Some of the members of this group approach the closely related genus *Boletus*, but are firmer, tougher and more lasting.

As to distribution, the species of *Scutiger* are, in general, limited to rather small areas; few of them are common, some are rare and local, and, so far as known, European and American species are entirely distinct. The indications are that the plants lack vigor and are easily affected by soil, climate and other environmental conditions. *Polyporus poripes* Fr. was placed in this group before the plant was fully known. Mature specimens show that it belongs rather with multiplex forms such as *Polyporus frondosus* under the genus *Grifola*. A somewhat older stage of *P. poripes* was described by Berkeley and Ravenel in 1872 as *P. flavovirens*.

Synopsis of the North American Species

1. Surface of pileus uneven, squamose or rugose. 2.
   Surface of pileus smooth, tomentose or glabrous. 4.
2. Pileus sulfur-yellow, pleuropus, surface ornamented with imbricated floccose wart-like scales, context white or yellowish, tubes small, angular, decurrent, white, becoming greenish when wounded, yellowish when dry, spores $9 \times 6\,\mu$. 1. *S. Ellisii.*
   Pileus brown. 3.
3. Tubes large, 1.5 mm. or more in diameter, hexagonal, surface of pileus smoky-brown ornamented with darker imbricated tufts of appressed hairs, context white, stipe excentric, its entire surface reticulate. 2. *S. retipes.*
   Tubes small, 0.5 mm. in diameter, polygonal, decurrent, white, pileus reddish-brown, rugose, stipe central, not reticulate. 3. *S. decurrens.*
4. Pileus light-colored, white, red or blue. 5.
   Pileus dark-colored, gray or brown. 7.
5. Pileus white, context white, tubes irregular, dissepiments thin, white, plants small, growing upon grass roots, stipe short, dark-brown. 4. *S. cryptopus.*
   Pileus red, glabrous, stipe short, concolorous, context rose-colored, tubes short, small, $1\text{–}2 \times 0.2$ mm., decurrent, orange-colored, spores ovoid, hyaline, $4 \times 5\text{–}6\,\mu$. 5. *S. laeticolor.*
   Pileus blue when fresh, changing to brown on drying. 6.

6. Tubes entire, becoming reddish-brown on drying, context ochraceous and pileus and stipe reddish-brown in herbarium specimens. 6. *S. caeruleoporus.*
Tubes lacerate, fading to grayish-brown or dirty white, context nearly white, pileus and stipe dull smoky-brown when dry. 7. *S. holocyaneus.*

7. Stipe black and rooting. 8.
Stipe neither black nor rooting. 9.

8. Pileus smoky-brown, subtomentose, margin thin, inflexed, context white, tubes regular, polygonal, entire, 2 mm. long, 0.5 mm. in diameter, stipe cylindrical, light-brown above, black and rooting below, spores white, elliptical, $7 \times 5\,\mu$. 8. *S. radicatus.*
Pileus drab-colored, nearly glabrous, margin thin, inflexed when young, context milk-white even when dry, tubes white, irregular, toothed, 1 mm. long, 0.25 mm. in diameter, stipe short, sooty-black as far as the decurrent tubes, attached to buried wood, spores white, $3\text{-}4 \times 5\text{-}7\,\mu$. 9. *S. subradicatus.*

9. Pileus gray, glabrous or nearly so, margin very thin, context rosy-gray, soft, fleshy, thin when dry, tubes small, 0.25–0.5 mm., unequal, decurrent stipe short, concolorous. 10. *S. griseus.*
Pileus brown. 10.

10. Stipe dark purple, very thick, pileus fulvous-brown, purplish at times, clothed with short tomentum, margin very obtuse, context reddish beneath the cuticle, marked when dry with a black concentric line limiting growth, tubes white, 2 to a mm. 11. *S. persicinus.*
Stipe yellowish-brown, usually excentric, plants caespitose, pileus yellowish-brown, pruinose, margin thin, context rose-tinted when dry, dark red next to the tubes, which are small, $1\text{-}3 \times 0.3$ mm., decurrent, rose-colored when dry, the edges fimbriate. 12. *S. Whiteae.*

1. **Scutiger Ellisii** (Berk.)

Polyporus Ellisii Berk. Grevillea, **7**: 5. 1878.

Polyporus flavosquamosus Underw. Bull. Torrey Club, **24**: 84. 1897.

This plant was first collected by Ellis in low woods near Newfield, New Jersey. In 1886 only two specimens of it were known to Ellis, the one just mentioned and one collected in South Carolina by Ravenel. In 1897 it was found in Alabama by Mrs. Earle and redescribed by Underwood as *P. flavosquamosus.* The specimen thus described was growing on clayey soil in pine woods and was large and of advanced age, for it was in February that it was found. Very young plants of this species were collected in the same locality by Bradford in December, 1900, which measured over three inches across, emitting when fresh a "strong unpleasant odor." The indications are, judging from the meager knowledge at our command, that this attractive species is at home in the gulf states and grows but sparingly above the Carolinas.

2. **Scutiger retipes** (Underw.)

Polyporus retipes Underw. Bull. Torrey Club, **24**: 85. 1897.

The type collection of this species was made in Alabama in 1897 by Mrs. F. S. Earle. The plants were found in autumn growing on the ground in pine woods. Collections were made later in Alabama by Earle and Baker. In color and stature this species resembles specimens of *Polyporus ovinus* sent from Upsala to Kew, but the pores are very much larger and the species are very distinct.

3. **Scutiger decurrens** (Underw.)

Polyporus decurrens Underw. Bull. Torrey Club, **24**: 83. 1897.

This is a very distinct species, about which little is known. The type plants were collected by Dr. Hasse near Pasadena, California, growing in the soil on the side of a cañon. The collection was made in February, 1896, and no new collections of the species have been reported since.

4. **Scutiger cryptopus** (Ell. & Barth.)

Polyporus cryptopus Ell. & Barth. Erythea, **4**: 79. 1896.

A very distinct and interesting species found by Bartholomew in Kansas attached to dead grass roots in sandy pastures. The name refers to its habit of lying flat on the ground and thus concealing the stipe, in which position the pilei look like small whitish discs.

5. **Scutiger laeticolor** sp. nov.

A thick central-stemmed plant of rather large size with a smooth red pileus and orange-colored tubes. Pileus circular in outline, depressed at the center, 10 × 10 × 1 cm.; surface glabrous, brick-colored to purplish-red, margin acute, at first inflexed, irregularly undulate: context fleshy-tough, pale rose-colored, homogeneous, 0.75 cm. thick; tubes 1–2 mm. long, 5 to a mm., decurrent, rather dark orange throughout, mouth subcircular or polygonal, dissepiments thin, toothed at times, especially when decurrent: spores ovoid, smooth, hyaline, copious, 4 × 5–6 μ: stipe short, thick, increasing upward, 2 × 1–2.5 cm., resembling the pileus in color, but solid, firm and tough, with darker flesh.

The above description is made from a rather old and somewhat faded dried specimen collected by Underwood in Alabama in

November, 1895, and now in the Underwood herbarium. Although the description is on this account unsatisfactory, the plant is nevertheless very distinct and must be highly attractive when seen at its best. The only other plant of this species that I have seen is one at Kew sent by Ravenel under the name *P. confluens*. This specimen however, does not figure in my description, since I have made no special study of it. Like most of the other members of the genus, this species is doubtless rare and probably confined to the states south of Virginia. The appearance of the stipe indicates that it is terrestrial, growing unattached in soil rich in humus. The name I have chosen for it refers to its brilliant coloring throughout.

6. **Scutiger caeruleoporus** (Peck)

Polyporus caeruleoporus Peck, Rep. N. Y. State Mus. **26**: 68. 1874.

EXSICC.: New York, *Peck, Ellis;* Vermont, *Morgan;* North Carolina, *Atkinson.*

This rare and beautiful species is found on the ground in woods during midsummer. In sheltered spots the whole plant is externally grayish-blue in color, the blue fading gradually to gray upon exposure. Specimens have been found with one half of the pileus exposed and faded, while the other sheltered half was normal. In drying, the blue color disappears, being retained longer in the hymenium than in the surface of the pileus. It was from partially faded specimens that the plant was first described. Herbarium specimens in the Ellis collection are fulvous with darker hymenium and ochraceous flesh. How long the grayish-blue color remains after drying I cannot tell.

7. **Scutiger holocyaneus** (Atk.)

Polyporus holocyaneus Atk. Jour. Myc. **8**: 117. 1902.

This species was collected near Blowing Rock, North Carolina, by Atkinson and Troyer in September, 1901. Several plants were found growing gregariously on the ground beneath coniferous trees. When fresh they were entirely blue, but in drying the color changed to dull brown. In this and several other respects the species resembles *Scutiger caeruleoporus*, from which, however, it is quite distinct.

8. **Scutiger radicatus** (Schw.)

Polyporus radicatus Schw. Proc. Acad. Sci. Phila. **4**: 155. 1834.

Polyporus Morgani Peck, Rep. N. Y. State Mus. **32**: 34. 1879.

Polyporus Kansensis Ell. & Barth. Erythea, **4**: 1. 1896.

EXSICC.: Ohio, *Lloyd, Morgan;* Indiana, *Underwood;* New York, *Overacker;* Canada, *Dearness, Macoun;* Kansas, *Bartholomew.*

This species is found from September to November in woody earth or on much-decayed wood about stumps or dead trunks. It is large and conspicuous and is quite easily recognized by its brown cap, large pores and long stipe, which is black and radicate at the base. The species ranges from Pennsylvania north to Canada and west to Ohio and Kansas, where it has been twice renamed. A specimen from Washington agrees with this plant in many respects, but has a darker, rougher pileus and firmer substance, with some differences in pore-structure. I hesitate, however, to describe it as new without more material, since *S. radicatus* is somewhat variable even in its type locality.

9. **Scutiger subradicatus** sp. nov.

A rather large thin plant with light brown almost glabrous surface, small white serrated tubes and short black stipe. Pileus irregular in outline, convex to plane, 12 × 9 × 0.5 cm.; surface fibrillose, drab-colored to isabelline, margin very thin, inflexed when young, irregularly undulate at maturity: context fleshy-tough, 1–7 mm. thick, pure milk-white even when dry; tubes mere areoles at first, short and small at maturity, scarcely 1 mm. in length, 3–4 to a mm., decurrent to the blackened part of the stipe, white, yellowish when dry, mouths polygonal, regular, at length much elongated by confluence or otherwise irregular, edges thin, toothed or fimbriate when mature: spores ovate to ellipsoidal, smooth, hyaline, not abundant, 3–4 × 5–7 μ: stipe short, thick, central, tapering and attached at the base, sooty-black up to the pores, 4 × 2.5 cm.; context milk-white, firm, fleshy-tough, surface minutely tomentose, rugose-reticulate when dry.

Two young plants of this species were collected by Dearness at London, Canada, in September, 1896, and a finely developed plant was recently found in New York by Mrs. M. L. Overacker. The

three plants form a perfect series in development. All grew attached to decaying wood beneath the soil. The pores are not rounded and punctiform when very young, but large and areolate like those of *Merulius*, the short walls being built up from these ridges like the cells of a honey-comb without increasing in diameter. At first glance, one would say that this species is a peculiar form of *S. radicatus*, but a little investigation shows that it is quite distinct. Because of this superficial resemblance, however, I have assigned to it the name given above.

10. **Scutiger griseus** (Peck)

Polyporus griseus Peck, Rep. N. Y. State Mus. **26**: 68. 1874.

Polyporus Earlei Underw. Bull. Torrey Club, **24**: 84. 1897.

EXSICC.: New York, *Peck;* New Jersey, *Ellis, Stevenson;* Alabama, *Earle.*

This species has been found on the ground in open deciduous woods in New York and New Jersey and in pine woods in Alabama. It is the only member of the genus that has been collected in any quantity. Its place in the American flora is very much the same as that occupied by *P. leucomelas* in Europe, though the two species are certainly distinct.

11. **Scutiger persicinus** (Berk. & Curt.)

Polyporus persicinus Berk. & Curt. Grevillea, **1**: 37. 1872.

Little is known of this plant beyond the original description in Grevillea and a longer one by the same authors in the Centuries of North American Fungi. It was first found by Ravenel in South Carolina growing at the base of trunks in pine woods. A study of the type at Kew shows it to be a very distinct species, while its large size and dark brown or purple color must make it conspicuous among related species when seen in the fresh state. While bearing an outward resemblance to *P. Schweinitzii*, its context and pores are white when fresh, changing to gray when dried, and this color is uniform, except for a black line showing in cross-section as a limit of growth for a certain period. The margin of the pileus is very obtuse and lobed or quite irregular from confluence.

12. **Scutiger Whiteae** sp. nov.

A plant of medium size, growing in clusters, with yellowish-brown pileus and tubes that are white when fresh and rose-colored when dry. Pileus subcircular in outline, convex, depressed at the center, 8–12 × 0.5–1 cm.; surface pruinose, velvety to the touch, isabelline to fulvous, margin acute, at first inflexed, irregularly undulate at maturity: context fleshy-tough, 0.2–0.5 cm. thick, of nutty flavor, rose-tinted when dry, dark red next to the tubes; tubes 0.1–0.3 cm. long, 3 to a mm., very decurrent, white when young and fresh, rose-colored when bruised or dried, mouths circular or subcircular, edges thin, fimbriate: spores ovoid, hyaline, smooth, copious, 3.5 × 5 μ: stipe short, usually excentric, enlarged at the base, 3 × 2–4 cm., concolorous, tough: plants caespitose, often confluent at the base, all stages of development being found in one cluster.

A fine collection of this species was made by Miss V. White at Bar Harbor, Maine, in August, 1901. The plant was found growing among moss on a damp river bank and seemed to her to resemble *Hydnum repandum* in general habit. Accompanying the specimens are excellent field notes and drawings in water colors.

Plants sent to Kew as *P. ovinus* by Farlow from New Hampshire seemed to me to agree with Miss White's specimens, but no special study of them was made. A few other stray American plants in foreign herbaria lead me to think that this species may possibly range as far south as Ohio, but that its proper home is in New England.

Porodiscus gen. nov.

Hymenophore small, annual, tough, epixylous, erumpent from the lenticels of dead branches; stipe attached to the vertex of the pileus, usually curved at maturity; context white, fibrous, tubes cylindrical, short, one-layered, mouths constricted; spores globose, smooth, hyaline.

The type of this genus is *Polyporus pocula* (Schw.) Berk. & Curt., first described by Schweinitz as *Peziza pendula* and later as *Sphaeria pocula*. By Fries it was first assigned to the genus *Cyphella* and later formed the basis of the new Friesian genus *Enslinia*, which name, however, was preoccupied by *Enslinia* Rchb. The fruit body matures slowly and resembles a discomycete in its early stages, hence the confusion in regard to its sys-

tematic position. The name I have chosen for the genus refers to this resemblance. There is only one species known.

Porodiscus pendulus (Schw.)

Peziza pendula Schw. Syn. Fung. Car. 92. no. 1183. 1818.

Cyphella pendula Fr. Syst. **2**: 203. 1822.

Sphaeria pocula Schw. Proc. Acad. Sci. Phila. **4**: 189. *pl. 2. f. 6.* 1834.

Enslinia pocula Fr. Summ. Veg. Scand. **2**: 399. 1849.

Polyporus pocula Berk. & Curt. Proc. Am. Acad. Arts & Sci. **4**: 122. 1859.

Polyporus cupulaeformis Berk. & Curt. Grevillea, **1**: 38. 1872.

This species has been much confused because of its similarity to members of other groups. Schweinitz at first called it *Peziza digitalis* Alb. & Schw. (Consp. Fung. 315, no. 943. *pl. 5. f. 1.* 1805), a European plant which it outwardly resembles, but in publishing it he adds "nisi nova, minor, durior, *pendula* a me nominata." That this name *pendula* was unpublished previous to this time is indicated by the fact that he cites this as the place of its publication under *Cyphella pendula* in Proc. Acad. Sci. Phila. **4**: 184. 1834. That it was in common use may be judged from the fact that Fries got it in manuscript from Schwaegrichen, a friend of Schweinitz and the editor of his work on the fungi of Carolina.

When Schweinitz received more mature specimens of the same species from Dr. Torrey collected on branches of ash, he named it *Sphaeria pocula*, at the same time stating that the plant was entirely similar to his *Cyphella pendula*, except for the presence of perithecia. A southern form on sumac was later named *Polyporus cupulaeformis* by Berkeley and Curtis. The confusion that has arisen is partly due to the small size of the plant and the changes that take place in it as it develops. On emerging from the bark of its host it is erect, sessile and depressed at the center without the appearance of a *Polyporus*. Later, the central depression is occupied by a porous hymenium and a stipe develops, which varies in length and is more or less curved according to its position on the branch. The surface could hardly be called tomentose, but is uniformly covered with a brown powder, which bleaches and partly disappears in age.

As to locality and host, this species shows little choice, being found on dead branches of chestnut, oak, hickory, sumac, red cedar and other trees from New England to Florida. I have found it very common on dead branches pruned from chestnut trees in the woods and parks about New York City. Some of these branches are entirely infested with the fungus, even to the smallest twigs. According to Schweinitz, it was also common on chestnut around Bethlehem, Pennsylvania.

Specimens examined: Rav. Fung. Car. 10, 210, Ell. & Ev. N. A. Fung. 308, 2728, Rabenhorst-Winter Fung. Eur. 3328 (from America); Georgia, *Ellis;* South Carolina, *Ravenel;* Florida, *Calkins;* West Virginia, *Nuttall;* Missouri, *Demetrio;* Pennsylvania, *Ellis;* New Jersey, *Ellis, Murrill;* Delaware, *Commons;* Connecticut, *Thaxter.*

NEW YORK CITY.

Bromeliaceae Nicaraguenses Novae

Carl Mez

Catopsis Bakerii Mez sp. nov.

Foliis bene acutis, in caudulam impositam desinentibus; scapi erecti vaginis foliaceis, internodia superantibus; inflorescentia paupere subdenseque 2-pinnatim panniculata; bracteis primariis quam ramuli axillares brevioribus, inferioribus flores infimos attingentibus; bracteis florigeris patentibus, quam sepala permulto brevioribus; floribus fere absque dubio dioicis; sepalis asymmetricis; stylo brevissimo.

Epiphyta, acaulis, florifera ± 0.3 m. alta. Folia ± 7, ad 0.18 m. longa, super vaginam ± 18 mm. lata, lingulata. Inflorescentia subpauciflora, bene virens, glaberrima, ± 100 mm. longa, non nisi ♀ et fructifera cognita; ramulis suberectis vel infimis suberecto-erectis, ultra medium sterilibus, usque ad 50 mm. longis; bracteis primariis suberectis, inferioribus vaginis scapalibus isomorphis; bracteis florigeris naviculari-concavis, latissime ovatis, apice rotundatis et hic brunnescenti-maculatis. Flores suberecti, ♀ vix infra 7 mm. longi; sepalis subcoriaceis, glabris, vix venosis, latere tecto in alam maximam productis. Capsula ex ovoideo breviter rostrata, ± 10 mm. longa, seminum lanâ pallide ferrugineâ.

Nicaragua, dept. Granada in vulcano Mombacho, arboribus sylvestribus epiphyta: C. F. Baker, no. 2460. — Fructificat Februario.

Obs. — *Catopsi Morrenianae* Mez affinis, imprimis inflorescentiae spicis abbreviatis et bracteis sat minoribus nec non habitu diversa.

Tillandsia (§ *Platystachys*) **orthorhachis** Mez et C. F. Bak. sp. nov.

Foliis utrinque lepidibus pallidis adpressis obtectis praesertim subtus cinerascentibus, persensim acutis; inflorescentia paupere panniculata e spicis ± 6 laxiusculis, pinnatis composita; bracteis florigeris stricte erectis, haud vel vix imbricatis, axes omnino rectos haud obtegentibus, dorso glabris et manifeste venoso-lineatis, apice acutiusculis, sepala longe superantibus; floribus stricte erectis; sepalis subaequaliter liberis.

Acaulis, florifera metralis. Folia utriculatim rosulata, basi in vaginas magnas, ovales, dense lepidibus inferioribus immersis, centro late brunneis margine pallidis consitas dilatata, ± 0.35 m. longa, super vaginas ad 25 mm. lata, inde in apicem eleganter recurvum,

crasse subuliformem persensim angustata elongatissime subtriangularia, sicca rigida. Scapus folia longe superans, validus erectusque, dense vaginis inferioribus in laminas subulatas recurvas desinentibus superioribus haud laminigeris apice acutis, erectis adpressisque, internodia superantibus involutus. Inflorescentia submultiflora, laxe 2-pinnatim e spicis sat elongatis, linearibus, usque ad 140 mm. longis, basi prophylla compluria bracteiformia gerentibus composita, folia perlonge superans, ± 250 mm. longa; spicis 8–14-floris, suberecto-erectis, axibus nullo modo undulatis vel geniculatis, valde angulatis, glabris; bracteis primariis omnino vaginis superioribus scapalibus isomorphis, quam spicae permulto brevioribus, ramuli axillaris basin haud involventibus; bracteis florigeris ± 15 mm. distantibus, praeter marginem anguste membranaceum coriaceis, nullo modo carinatis, explanatis anguste ellipticis, intus glabris, ± 20 mm. longis et 7 mm. latis. Flores stricte erecti, rhachi adpressi, pedicellis brevibus (vix 3 mm.) angulatis stipitati; sepalis 12 mm. longis, anguste ellipticis, apice rotundatis, glabris, prominulo-venosis, subcoriaceis. Capsula ad 35 mm. longa, subcylindrica angulis 3 rotundatis, bene acuta.

Nicaragua, dept. Chinandega, prope Realejo, arboribus epiphyta: C. F. Baker, no. 2092.— Fructificat Januario.

Obs. — Species perinsignis, absque dubio *Tillandsiae adpressiflorae* Mez Guyanensi characteribus proxima, habitu magis ad *T. utriculatam* L. accedens, ab omnibus affinibus spicarum rhachibus rectis sat diversa.

Guzmania (§ *Euguzmania*) **Nicaraguensis** Mez et C. F. Bak. sp. nov.

Foliis subtus densiuscule lepidibus peradpressis pallidis conspersis;. inflorescentia subpauciflora, simplicissima, dense spicata, apice haud sterili; bracteis membranaceis, haud umbrino-farinosis, explanatis inferioribus late acutiusculis superioribus rotundatis, flores singulos in axillis gerentibus; sepalis ad 3 mm. connatis, nullo modo corollinis.

Epiphyta, acaulis, florifera ± 0.3 m. alta. Folia ad 10 infundibuliformi-rosulata, basi in vaginas manifestas, bene ovales, densissime lepidibus peradpressis brunneis punctulatas dilatata, ± 0.3 m. longa, medio 20 mm. lata, lingulato-linearia, apice peracuta haud pungentia, chartacea, supra saturate subtus pallide viridia. Scapus quam folia multo brevior sed manifestus, erectus, glaber, vaginis subinflatis, ex ovali acutis, erectis, internodia superantibus dense involutus celatusque. Inflorescentia vix 100 mm. longa, per anthesin subfusiformis; bracteis lucide rubris, subinflatis, venoso-

lineatis, glabris, siccis paullo nitidulis. Flores saturate flavi, per anthesin bracteas bene superantes, sessiles, 60 mm. longi, strictissime erecti; sepalis 25 mm. longis, anguste conice conniventibus, apice rotundatis, asymmetricis. Petala sepalis ad 33 mm. longiora, ut ex sicco videtur peralte in tubum inferne tenuiter cylindricum superne infundibuliformem coalita demum in lobos ellipticos, rotundatos discreta. Stamina petalis paullo breviora; filamentis alte cum petalis cohaerentibus; antheris brevibus (vix 4 mm. longis), basi sagittatis apice breviter acuminulatis, haud cohaerentibus. Ovarium subpyramidatum in stylum quam stamina multo breviorem sensim angustatum.

Nicaragua, dept. Granada, in vulcano Mombacho, magnis caespitibus arboribus sylvestribus epiphyta: C. F. Baker, no. 2477. — Floret Februario.

Obs.— Species pulcherrima, *Guzmaniae erythrolepidi* Brongn. Antillanae proxima.

Guzmania (§ *Euguzmania*) **platysepala** Mez et C. F. Bak. sp. nov.

Foliis subtus fere omnino glabris; inflorescentia multiflora, simplicissima, densissime spicata, apice haud sterili; bracteis tenuiter membranaceis, glabris, flores singulos in axillis gerentibus; sepalis 15 mm. longis et 8 mm. latis, basi ad 4 mm. connatis, nullo modo corollinis.

Epiphyta, acaulis, florifera ± 0.3 m. alta. Folia subpauca infundibuliformi-rosulata, basi in vaginas manifestas, ovatas, ellipticas, dense immerseque lepidibus alutaceis punctulatas dilatata, ± 0.3 m. longa, medio vix 20 mm. lata, lingulato-linearia, apice peracuta haud pungentia, chartacea, ex sicco vinoso-rubentia. Scapus quam folia multo brevior, validissimus, erectus, glaber, dense vaginis in stirpe typica delapsis indutus. Inflorescentia non nisi fructifera cognita ± 140 mm. longa et 65 mm. diam. metiens, cylindrica, apice obtusa; bracteis fere omnino delapsis sepala certe longe superantibus. Flores suberecto-erecti, sessiles, sepalis fructiferis crasse coriaceis, castaneis, superne leviter venoso-lineatis, glabris, latissime rotundatis, fere symmetricis. Capsula crassa, subcylindrica, bene acuta, ± 35 mm. longa. — Cet. ignota.

Nicaragua, dept. Granada, in vulcano Mombacho, arboribus sylvestribus epiphyta: C. F. Baker, no. 2345. — Fructificat Februario.

Obs.— Species praecedenti absque dubio affinis, fructifera quoque a reliquis *Eu-Guzmaniis* inflorescentiam apicem usque fertilem praebentibus sepalorum forma optime distincta.

The American Species Referred to Thinnfeldia

By Edward W. Berry

The genus *Thinnfeldia* was established by Ettingshausen in 1852 * to include certain fern-like remains from the European Jurassic, which from their resemblance to the living species of *Phyllocladus* he referred to the Coniferae. Considerable diversity of opinion has since existed as to their true affinity. Thus Schenk considers them members of the Cycadales, while F. Braun refers them to the Filicales, where they are admitted by both Schimper and Saporta, and formerly by Nathorst, though latterly he regards them as Conifers. Potonie (Natürlichen Pflanzenfamilien, 1900) includes the genus among the Filicales of the tribe Pecopterides, but he evidently does not include the American or Arctic species which have been referred to this genus.

In 1874 Oswald Heer described a species from the Cretaceous of Spitzbergen as *Thinnfeldia arctica* (incorrectly spelled *Thinfeldia* by him). Turning to this country we find Lesquereux in 1868 describing a species from the Dakota group as *Phyllocladus subintegrifolius*. Subsequently Heer described apparently identical remains, which were found in considerable abundance in the Atane beds of Greenland, transferring them to the genus *Thinnfeldia* and renaming the species *Thinnfeldia Lesquereuxiana*, classing it under the heading "Incertae sedis" directly following the ferns.

In 1889 Fontaine described three species of *Thinnfeldia* from the Potomac formation of Virginia, including them among the ferns, where they are undoubtedly rightly placed. Additional species from various American localities have been noted or characterized by Newberry, Hollick, Fontaine and Knowlton. It is obvious from the foregoing that the genus is a rather indefinite one not well understood and badly in need of revision, which task I have attempted for the American species. I have not included the European species because of lack of material. Judging from those I have seen figured and from Lesquereux's remarks on

* Ettings. Abhandl. k. k. Geol. Reichsanstalt, 1^3: no. 3, 2. 1852.

others,* I should say that they are correctly classed among the Filicales.

The American species which have been referred to this genus embrace two distinct types of plants. Those from the older Cretaceous beds of Potomac age and from the Triassic apparently represent true ferns comparable with the European type, and since the genus as properly restricted is an old one, not appearing elsewhere after the close of the Jurassic (except for the doubtful *Thinnfeldia variabilis* Velen.) the American Cretaceous species of Fontaine may be regarded as the dwindling remnants of an older flora (only one of his species is at all common or occurs outside of Virginia), thus forming one of the many surviving elements in the Potomac flora that gave it such a decidedly Rhaetic facies. It is quite otherwise with the middle and upper Cretaceous species which have been referred to the same genus. They are all much larger-leaved plants and some of them have a wide distribution. The remains in themselves are unmistakably characteristic, although their true botanical affinity is perhaps not so plain; superficially there is considerable resemblance to the polymorphous filicalean genus *Sagenopteris* from the older Mesozoic of this country and Europe, but this resemblance is only superficial.

Each describer has doubtingly referred his specimens to *Thinnfeldia* as a matter of convenience or precedent rather than from any conviction of relationship with the species from the older formations, and all have noted their resemblance to the existing species of *Phyllocladus*. I have made careful comparisons with the living material available at the New York Botanical Garden and am thoroughly convinced that all of the mid- and late Cretaceous species should be included in the coniferous family Taxaceae. They may perhaps form a link between the Podocarpeae and the Taxeae, and while they are unmistakably related to *Phyllocladus* their extremely large size compared with the existing members of that genus and other minor differences such as petiolate forms and the general absence of crenate margins make it desirable to refer them to a new genus which while indicating their proper relationship shall keep them distinct from the existing small-leaved species. This genus may be designated *Protophyllocladus*, and such additional

*Fl. Dak. Group, 34.

remarks as may be necessary may well be made in considering the respective species.

Protophyllocladus gen. nov.

Comparatively large leaves, of coriaceous texture; linear to ovate-lanceolate in outline; with entire, somewhat undulate, or slightly crenate margins: mostly broader toward the apex: with straight narrowly wedge-shaped base: slightly petiolate: midrib usually stout below, often becoming obliterated toward the apex: secondaries fine, numerous, parallel, occasionally forked, usually buried in the parenchyma of the leaf; they leave the midrib at an acute angle and run directly to the margins.

Constituting well characterized remains ranging from the middle Cretaceous to the basal Tertiary.

Protophyllocladus subintegrifolius (Lesq.)

Phyllocladus subintegrifolius Lesq. Am. Jour. Sci. **46**: 92. 1868; Cret. Flora, 54. *pl. 1. f. 12.* 1874; Fl. Dak. Group, 34. *pl. 2. f. 1–3.* 1892.

Thinnfeldia Lesquereuxiana Heer, Fl. Foss. Arct. **6**[2]: 37. *pl. 44. f. 9, 10; pl. 46. f. 1–12 a, 12 b.* 1882; Newb. Fl. Amboy Clays, 59. *pl. 11. f. 1–17.* 1896; Hollick, Trans. N. Y. Acad. Sci. **11**: 99. *pl. 3. f. 6.* 1892; Bull. Geol. Soc. Am. **7**: 12–14. 1895; Ann. N. Y. Acad. Sci. **11**: 58. *pl. 3. f. 4, 5.* 1898; **11**: 419. *pl. 36. f. 6.*

Thinnfeldia subintegrifolia Knowlton, Bull. U. S. Geol. Surv. **152**: 228. 1898; Hollick, Bull. N. Y. Bot. Gard. **2**: 403. *pl. 41. f. 13, 14.* 1898.

This is a most wide-spread species, ranging in considerable abundance from Greenland to New Jersey and west to Kansas and Nebraska, in beds of approximately the same age, quite the opposite from what would occur if it represented a waning type.

Originally referred to *Phyllocladus* by Lesquereux, his type figure (*f. 12. pl. 1*, Cret. Flora) is identical in outline with certain leaves of the living *Phyllocladus asplenifolia* Hook. f. (*P. rhomboidalis* Rich.) in which, however, the larger leaves are crenate, while those most like the fossil are somewhat smaller. The resemblance is also markedly close to an undescribed *Phyllocladus* (No. 6282, herb. N. Y. Bot. Gard.) from the Lake Brunner district of the South Island, New Zealand. In this form the leaves

are very variable, ranging from nearly simple to almost pinnately parted, some with but the slightest indication of the pronounced crenations of others.

Subsequently discovered remains from Kansas are considerably larger than Lesquereux's type specimen, as are also a number of the Greenland specimens. Some of the Raritan forms have a somewhat different aspect, being long and narrow; sometimes the margins are entire, oftener they are undulate or toothed. Newberry, who examined some hundreds of leaves, so abundant are they in the Raritan clays, says "the aspect which they present is not quite that of any known ferns" and he places them among "Coniferae of Uncertain Affinities." Were the linear form and toothed margins constant features these leaves might be considered specifically distinct, but the specimens show every gradation to forms undistinguishable from those of this species from other localities. *Pl. 11, f. 16*, Fl. Amboy Clays is very similar in all respects to *Podocarpus Nagcia* R. Br. from the existing flora of Japan, but there is no resemblance to any other species of *Podocarpus* that I have seen.

An additional locality that may be noted for this species is in the Matawan formation near Cliffwood, N. J.

All these leaves have the aspect of *Phyllocladus*, easily seen but scarcely definable, and except for their large size are strictly comparable, the leaves of *Phyllocladus* showing the same variability of outline as do the fossil leaves.

Protophyllocladus lanceolatus (Knowlton)

Thinnfeldia lanceolata Knowlton, Bull. U. S. Geol. Surv. **105**: 49. *pl. 5. f. 5.* 1893.

This species, which occurs in Montana in beds of Laramie age, is related to the preceding, but is larger, with pointed apex, and according to Knowlton, with entire margin, although his very perfect figure shows slight and wide crenations. He considers it to be closely allied to the existing genus *Podocarpus*, pointing out its resemblance to *Podocarpus macrophylla* Don, a southeastern Asiatic species, *Podocarpus Rumphii* Bl. and *Podocarpus leptostachya* Bl., East Indian and Malayan species, and *Podocarpus salicifolia* Kl. & Karst., a tropical American species. Specimens of the

latter, which seems to be the most similar to the fossil leaf, from St. Kitts and Central America are somewhat smaller, although specimens from the north coast of South America average larger and exactly resemble the fossil leaf in size and outline. They differ, however, as do most of the Podocarpeae, in their very entire margins, their indistinct vertical secondaries and the form of their midrib, which in all species of *Podocarpus* which I have seen, except *Podocarpus Nageia* R. Br. from Japan, is thick and prominently marked to the tip of the leaf, while in the fossil leaf the midrib is obliterated by its dichotomous branching some distance below the apex and the secondaries branch at an acute angle and do not parallel the midrib.

Protophyllocladus polymorphus (Lesq.)

Salisburia polymorpha Lesq. Am. Jour. Sci. II, **27**: 362. 1859 (nom. nudum); Ann. Rep. U. S. Geol. & Geog. Surv. Terr. **1872**: 404. 1873; Tert. Fl. 84. *pl. 6. f. 40, 41.* 1878.

Thinnfeldia polymorpha Knowlton, Proc. Biol. Soc. Wash. **7**: 153. 1892; Bull. U. S. Geol. Surv. **105**: 47. *pl. 5.* [*1*]. *f. 1–4.* 1893. (Not *T. polymorpha* Ettingshausen, 1860.)

Thinnfeldia montana Knowlton, Bull. U. S. Geol. Surv. **152**: 227. 1898; Bull. U. S. Geol. Surv. **163**: 11. *pl. 1. f. 1–3.* 1900.

Fragmentary remains from Nanaimo, Vancouver Island, were named *Salisburia polymorpha* by Lesquereux and were subsequently described and figured for a final report which was never published. He afterward described under the same name specimens from Montana, although not positive of their identity with the Vancouver specimens. Whatever may be the final disposition of the Nanaimo forms, those from Montana are certainly not referable to *Salisburia* (*Ginkgo*), although evidently Coniferous. Lesquereux's type figures (Tertiary Flora, *pl. 60. f. 40, 41*), greatly resemble in both form and venation certain leaves of existing species of *Phyllocladus*, for instance *Phyllocladus asplenifolia* Hook. f., although they are somewhat larger, and the remains referred to this species by Knowlton are still larger and petiolate. This species is closely allied to the two preceding and according to Knowlton is positively related to *Phyllocladus*. It occurs in beds of Montana,* Laramie, and Livingston age.

* Belly River series, on the Missouri River seven miles below Coal Banks, Montana, in strata which are at least in part synchronous with the Montana formation.

THINNFELDIA Ettings. Abhandl. k. k. Geol. Reichsanstalt, **1**[3]: No. 3, 2. 1852 (restricted)

Fontaine * gives the following diagnosis, which is very nearly that of Schimper: "Fronds bipinnate or tripinnate; pinnules varying much in size and shape, mostly oblong, ovate-lanceolate or oblong-lanceolate, decurrent and mostly confluent at the base; coriaceous; primary nerve of the pinnules dissolved before attaining the apex into many dichotomous nerves; secondary nerves going off at a very acute angle, diverging in ascending, several times dichotomous." Filical remains from the older Mesozoic.

Thinnfeldia Fontainei nom. nov.

Thinnfeldia variabilis Font. Potomac Flora, 110. *pl. 17. f. 3–7; pl. 18. f. 1–6.* 1889; Font. in Stanton, Bull. U. S. Geol. Surv. **133**: 15. 1895.

Fontaine's name is antedated by *Thinnfeldia variabilis* Velen. (Gymnosp. Böhm. Kreidef. 6. *pl. 2. f. 1–5; pl. 3. f. 12.* 1885), an altogether different species as pointed out by Hollick.† It is fitting that the new name should commemorate the original describer.

This is the most common fern near Brooke, Virginia, and reappears in the Knoxville beds of Tehama County, California, the only species of *Thinnfeldia* at all common in the Potomac or reappearing at any other locality. It is unnecessary to redescribe this species; no one has ever doubted that it is a fern. Though specifically different it closely resembles *Thinnfeldia rhomboidalis* Ett.

THINNFELDIA GRANULATA Font. Potomac Flora, 111. *pl. 26. f. 10–12; pl. 27. f. 1–5, 8; pl. 169. f. 1.* 1889

A rare fern found only near Dutch Gap Canal and near Potomac Run, Virginia, in the Potomac formation. Resembles *Mariopteris muricata* (Schloth.) Zeiller.

THINNFELDIA ROTUNDILOBA Font. Potomac Flora, 111. *pl. 27. f. 6, 7.* 1889

This fern is still rarer than the preceding; it is recorded from Fredericksburg and near Potomac Run, Virginia, in Potomac strata. Resembles *Sphenopteridium dissectum* (Göpp.) Schimper.

* Potomac Flora, 110. 1889.

† Bull. N. Y. Bot. Gard. **2**: 404. 1902.

THINNFELDIA? RETICULATA Font. in Ward, Older Mesozoic Fl. U. S., Ann. Rep. U. S. Geol. Surv. **20**[2]: 235. *pl. 22. f. 1, 2.* 1900

Poor remains make this determination only provisional. It is undoubtedly a fern, however, possibly a new genus. The veins are strong and anastomose exactly as in *Thinnfeldia variabilis* Velen. Occurs in the Triassic near York Haven, Pennsylvania.

THINNFELDIA ARCTICA Heer (incorrectly spelled *Thinfeldia*), Fl. Foss. Arct. **3**: 123. *pl. 35. f. 11–16; pl. 36. f. 10b.* 1874

From the Cretaceous of Spitzbergen (Cape Staratschin); included here because of its resemblance to the upper pinnae of *Thinnfeldia Fontainei*, from which it differs only in the pinnules being more rounded at the apex.

THINNFELDIA VARIABILIS Velen. Gymnosp. Böhm. Kreidef. 6. *pl. 2. f. 1–5; pl. 3. f. 12.* 1885; Hollick, Bull. N. Y. Bot. Gard. **2**: 403. *pl. 41. f. 12.* 1902

This species is listed by Velenovsky under "Species Incertae Sedis." While it may not be a fern the venation is not that of a coniferous plant, and it may best be left in this genus provisionally; although in so doing the genus is brought down to the mid-Cretaceous, which is undesirable as this species has nothing in common with the other species and is undoubtedly generically distinct. Hollick's remains from the Cretaceous of Chappaquidick Island, Mass., are indistinguishable from the type.

PHYLLOCLADOPSIS Font. Potomac Flora, 204. 1889

For the sake of completeness in the enumeration of American Phyllocladian remains I append a short notice of the following species.

PHYLLOCLADOPSIS HETEROPHYLLA Font. Potomac Flora, 204. *pl. 84. f. 5; pl. 167. f. 4.* 1889

The thick texture and immersed venation are those of *Phyllocladus*, but the outline and margin are different; the general aspect is decidedly not that of a fern. But for the diverging veins to the

margin this species would fall in *Nageiopsis* Font., which is such a striking type in the Potomac flora, with fourteen species, so like the existing *Nageia* section of *Podocarpus*, that Fontaine hesitates in classing them as generically distinct. It curiously illustrates the mixed affinities of these ancient members of the Taxaceae.

The genus *Podocarpus* is abundantly preserved in European strata, Schimper (Pal. Végét.) enumerating nine species; *Phyllocladus* on the other hand has not yet been found, although Heer* describes some curious remains from the Cretaceous of Spitzbergen under the name of *Phyllocladites rotundifolius*.

PASSAIC, N. J.

* Heer, Fl. Foss. Arct. 3: 124. *pl. 35. f. 17–21.* 1874.

Some Notes on Juncus

By K. M. Wiegand

Since the publiction of a previous paper on *Juncus tenuis* and its allies in the Bulletin for October, 1900, a large amount of additional material has been studied, making some slight changes necessary in the treatment of the group.

The range of *J. dichotomus* is extended westward along the Gulf coast to Texas. Alabama (*Chas. Molir*); Mississippi (*S. M. Tracy*); Texas (*Nealley, Thurlow, Wurzlow*).

At the time of the previous publication *J. secundus* seemed confined to the Atlantic coastal plain, and *J. interior* to the Ohio and Mississippi Valleys and the Great Plains. Two specimens from the Mississippi Valley have appeared, however, which can in no way be distinguished from *J. secundus*, and not without considerable hesitation I am compelled to admit the occurrence of this species west of the Alleghanies. The specimens are: Missouri (Desoto, *H. E. Hasse*, 1887), Illinois (*Vasey* in Nat. Herb.). A plant from Lookout Mt. (*Eggert*) seems also to belong to this species.

The range of *J. occidentalis* is extended northward to Vancouver Island.

Specimens of *J. confusus* have now been studied from the following states and provinces: Alberta, Assiniboia, Washington (Spokane), Oregon (Warner Range), Idaho, Montana, Wyoming, Colorado.

J. Georgianus Coville has been found also in North Carolina on Dennis Mt. (*Small*).

Juncus Dudleyi Wiegand extends at least as far northwestward as Washington (Pullman, *E. R. Lake*, no. 175).

Juncus interior occurs in the following states and territories: Illinois, Kansas, Indian Territory, Colorado, Wyoming, New Mexico and Arizona.

Juncus Arizonicus curtiflorus Wiegand appears not to be distinct from *J. interior*. The material at hand when the description was

drawn showed sepals slightly longer than the capsule, but this now appears to be not at all constant. The range of *J. interior* is therefore extended into New Mexico and Arizona.

From Arizona and New Mexico other specimens have been received, however, which seem to be quite distinct not only from *J. Arizonicus* but also from all other hitherto described species. It seems best to present these here as follows:

Juncus Neo-Mexicanus sp. nov.

Perennial, 20–50 cm. high, rigid and erect, rather pale green and strongly striate: leaves in well grown plants half the length of the culm or less, flat, moderately narrow (0.5–1.75 mm. wide); sheaths loose, the margins membranous but scarcely scarious, tapering above to the auricles which are membranous and scarcely at all produced: inflorescence small, 2–8 cm. long, usually green even in fruit, not congested, the branches erect; bracts 2–3, at least one much longer than the inflorescence; bracteoles apiculate: flowers green, rather large; sepals 4–5 mm. long, rigid, pungent, strongly spreading, the membranous margins very narrow, all nearly similar; stamens 6, about one half the length of the perianth, anthers short: capsule conspicuously ovate, thick-walled, about $\frac{1}{5}$–$\frac{1}{4}$ shorter than the perianth; placentae not reaching to the axis; mature seeds not seen.

Arizona and New Mexico. Arizona — Huachuca (*E. Palmer*, no. 461*b*, 1890, type, Nat. Herb.), Cedar Springs, "growing abundantly in cool water of spring and outlet" (*J. W. Toumey*, no. 513, July, 1892); Grand Cañon, Yavapai Co. (*E. O. Wooton*, no. 1018, 1892). New Mexico — *E. Palmer*, 1869 (? too young).

Related to *J. Dudleyi* Wiegand and *J. tenuis* Willd., but differing from the former in the loose sheaths with simply membranous receding auricles. The flowers are as large as the largest of *J. Dudleyi* and even more comose in appearance. From *J. tenuis* it differs in the absence of scarious sheath-margins and auricles and in the usually more coriaceous capsule. In specimens at hand the plant has a peculiar rigid appearance, especially in the rigid pungent sepals, which is unlike that of the two related species.

The separation of *Juncus dichotomus* from its allies has always seemed a comparatively easy matter, because the leaves of that plant have been found to be nearly terete in every case and not flattened as in the other closely related species. As was noted in

my recent paper on this group, however, specimens from near the northern limit of the species show a distinct flattening of the leaves and therefore a transition toward *J. tenuis*. But in addition plants from much further south appear in the herbaria from time to time having the leaves nearly if not quite as much expanded as in any of the closely related forms. These are very confusing to the student who understands *J. dichotomus* in the old way, and it seems best to separate them under a distinct name. Since they are so exactly similar to *J. dichotomus* in all other respects, and because we know very little regarding how far this condition is due to environment, they have been considered as a variety rather than as a distinct species.

The forms under consideration are therefore to be understood somewhat as follows:

JUNCUS DICHOTOMUS Ell.

Differs from *J. tenuis* and *J. Dudleyi* in the peculiar olive-green color of the dried plant; but especially in the reddish-brown or purple basal sheaths, and the darker inflorescence; from *J. tenuis* also in the firm subcartilaginous rounded auricles, not scarious and prolonged; and from *J. Dudleyi* in the less cartilaginous auricles and normally more expanded inflorescence.

Juncus dichotomus platyphyllus var. nov.

Leaves expanded and flat, otherwise as in the typical form.

Massachusetts to Texas, along the coast. On Staten Island a form occurs only six inches high or less and with densely tufted leaves 1–2 inches long.

Some specimens representing this variety are the following in the Herbaria of Columbia University and the New York Botanical Garden:

Massachusetts, near Boston (*B. D. Greene*, 1829).

New York, Staten Island, old field near New Dorp (*Britton*).

Virginia, Hutton's Branch (*Britton and Vail*); Nansemond Co. (*Britton and Small*, May 27, 1893, type).

North Carolina, Chapel Hill and Bladen Co. (*W. W. Ashe*).

Mississippi, Starkville (*S. M. Tracy*).

CORNELL UNIVERSITY.

A Revision of the Family Fouquieriaceae

By George V. Nash

During an attempt to identify one of the species of *Fouquieria* which flowered in the conservatories of the New York Botanical Garden during the past June, much confusion was found to exist, both in the identification of herbarium material and in the literature bearing upon this family. So great was this confusion that the writer was eventually compelled to extend his examinations beyond the point he had anticipated, and finally realized that a revision of the family was necessary before any definite results could be obtained. No recent treatment, involving a consideration of the species, could be found, and the apparent need of such work encouraged the author to enter upon the following revision, which, it is hoped, will throw some light upon an interesting family and one but little understood. As here regarded, it embraces two genera and seven species, three of which are here described for the first time.

The relationship of the family is rather puzzling, and a satisfactory solution of the difficulty has not as yet been proposed. By Bentham and Hooker (Gen. Pl. **1**: 161) it was made a tribe of Tamaricaceae, and the same treatment was accorded to it by Engler and Prantl (Nat. Pfl. 3^6: 298). Subsequently Engler (Nat. Pfl. Nachtr. 251) maintained that the family was better kept separate from Tamaricaceae on account of its oily endosperm and gamopetalous corolla. Its distribution would also tend to confirm this distribution of the group, for Tamaricaceae, with Fouquieriaceae removed, is strictly Old World, while Fouquieriaceae itself is confined to North America, and primarily to its arid regions.

While Engler changed the rank of this family, he indicated no change in its relationship. It is hardly within the scope of a revision of this kind to discuss at length a matter of this nature, but the strong resemblance in many ways to certain forms of the Polemoniaceae cannot be passed by without some comment. In this connection it is well to remember that it was in this family, as a *Cantua*, that the original species was published. The 3-celled

ovary, the more or less united styles and the gamopetalous tubular corolla, to the base of which the filaments are slightly adnate, all markedly point in this direction. The spongy central column found in the dehiscing capsules would indicate that the inner edges of the septa unite. A transverse section of the ovary made at this time, and before the septa break away from the walls, would much resemble the condition of things existing in the genus *Gilia*, also found in the same region. The general resemblance of the flowers to those of some of the large-flowered red Gilias is perhaps the most striking feature of the plants. It is true that the sepals in this are distinct, while in *Gilia* they are more or less united, but this is but one character weighing against many others. It would seem to me that the ovarian, placental, style and corolla characters indicate a strong affinity with that family, much stronger than with the Tamaricaceae, to which family, polypetalous in all its other forms as are its immediate relatives, the gamopetalous corolla of Fouquieriaceae does violence.

FOUQUIERIACEAE DC. Prod. **3**: 349. 1828.

Shrubs or trees, the trunks simple, columnar and stout, or much branched: branches spine-branching. Spines developed within the petioles of the leaves on the new growth and becoming apparent when these fall. Leaves with the blades flat, entire, or rarely obcordate or emarginate: those on the young growth petioled, the petioles from one half as long as to equalling the blade. Secondary leaves borne in fascicles in the axils of the spines and sessile or nearly so. Inflorescence spicate to paniculate, terminal. Flowers sessile or pedicelled. Calyx of five free imbricated sepals. Corolla yellow or red, hypogynous, the segments united for one half their length or more: tube cylindric, sometimes broadened toward the apex: lobes flat or concave, imbricated in the bud, incurved, erect, spreading, reflexed or enrolled. Stamens ten to fifteen, of unequal length, exserted from the corolla-tube, and adnate to it at the very base: filaments subulate, usually broadened and compressed dorsally at the more or less pubescent base where they are sometimes coherent, sometimes provided with a scale-like appendage near the base: anthers acute at the apex, cordate at the base, elliptic to nearly ovate, introrse, versatile, attached below the middle, 2-celled, the cells opening longitudinally. Ovary 3-celled, the inner edges of the septa united at the base and at the very apex, free in middle, the septa finally

uniting by the inner edges and breaking away from the walls, forming a central column attached at the apex and at the base. Ovules 4–6, in two rows, in each cell, borne on the edge of the free portion of the septa. Styles 3, slender or stout, included in or exserted from the corolla, united only at the base or for their entire length. Capsule dehiscing loculicidally, 3-valved, the valves thick and coriaceous. Seeds oblong, compressed, at first broadly winged, the wing finally breaking up into long filaments similar to those on the body of the seed. Albumen thin, oily. Cotyledons flat, oblong to ovate, cordate at the base. Radicle short.

Genera two, both natives of Mexico, one, *Fouquieria*, also found in the adjacent parts of the United States. The *Idria* of Kellogg is often united with *Fouquieria*, but it seems more natural to keep it separate, both on account of habital characters and differences in the flowers. The short stout included styles united for their entire length, yellow flowers and columnar, normally unbranched trunk, justify this treatment.

Styles more or less united, but free at the apex, exserted, the column and branches slender: shrubs or trees with branching trunk: corolla red. 1. *Fouquieria.*

Styles wholly united, stout, short, included, forming a 3-angled stout body: tree with a stout columnar undivided trunk: corolla yellow. 2. *Idria.*

1. FOUQUIERIA H.B.K. Nov. Gen. & Sp. **3**: 452. 1820

Bronnia H.B.K. Nov. Gen. & Sp. **6**: 83. 1823.

Philetaeria Liebm. Vidensk. Selsk. Skr. V. **2**: 283. *pl.* 1851.

Shrubs or trees with spicate or paniculate inflorescence and red sessile or pedicelled flowers. Sepals less than one half as long as the corolla-tube. Corolla red, cylindric to campanulate, the segments united into a tube for one half their length or more, the tube sometimes gradually enlarged toward the apex: lobes from erect to recurved or enrolled. Stamens ten to fifteen, more or less broadened and compressed dorsally at the pubescent base. Styles slender, exserted, united only at the base, or nearly to the apex.

Species six; Mexico and the adjacent parts of the United States.

Inflorescence corymbiform-paniculate. 1. *F. fasciculata.*

Inflorescence conic to elongated paniculate, or spicate.

Corolla-tube cylindric, several times longer than the lobes.

Inflorescence spicate. 2. *F. formosa.*

Inflorescence paniculate.

Filaments unappendaged: panicle conic to ovate: bushy shrubs or trees.

Corolla-tube 3–4 mm. in diameter: sepals oval: panicle-branches slender. 3. *F. Macdougalii.*

Corolla-tube 5 mm. in diameter: sepals orbicular: panicle-branches stout. 4. *F. peninsularis.*

Filaments with a scale-like appendage near the base: panicle long and narrow: shrubs with long slender simple branches. 5. *F. splendens.*

Corolla campanulate, the tube about equalling the lobes. 6. *F. campanulata.*

1. **Fouquieria fasciculata** (R. & S.)

Cantua fasciculata R. & S. Syst. **4**: 369. 1819.

Fouquieria spinosa H.B.K. Nov. Gen. & Sp. **3**: 452. 1820.

Bronnia spinosa H.B.K. Nov. Gen. & Sp. **6**: 84. *pl. 528.* 1823.

Cantua spinosa Willd.; H.B.K. Nov. Gen. & Sp. **6**: 84. 1823.

Echeveria paniculata Mocino & Sessé; DC. Prod. **3**: 350. 1828.

A tree 4 m. tall or more, with white fragile wood and round glabrous spiny branches. Leaves fascicled in the axils of the spines, obovate-oblong, rounded at the apex or sometimes emarginate, cuneate at the base, glabrous, shining, about 2.5 cm. long and 9–10 mm. wide: panicle terminal, corymbose, much-branched, its branches glabrous: capsule about 1 cm. long: sepals nearly orbicular, about one fourth as long as the capsule: seeds oblong, compressed, the margin membranous-winged, the inner surface concave, the outer convex, brown, glabrous, the wings nearly entire, emarginate at the apex and at the base; episperm thinly membranous, adhering to the endosperm which is thin and fleshy; embryo included, straight, almost as long as the endosperm, compressed; cotyledons leafy, ovate, obtuse, cordate at the base, fleshy; radicle cylindric, somewhat acute, one third as long as the cotyledons.

The above description is drawn from the original in the work of Humboldt, Bonpland and Kunth, cited above. I have seen no specimens of this species, but its corymbiform panicle is unlike that of any of the others. The type material was in fruit only, and was secured at Puente de la Madre de Dios, at an altitude of about 5,280 feet. This place is somewhere in the neighborhood of Mexico City or Actopan, but it has not been possible for me, up to the present time, to locate it more definitely.

It is interesting to note here that this is the type of *Fouquieria*, a monotypic genus at that time, which was based on *Cantua fascic-*

ulata R. & S. (although H.B.K., for no apparent reason, credit it to Willdenow). Subsequently *Fouquieria* was again published, this time being based on an entirely different plant, *F. formosa*, and at the same time *F. spinosa*, alluded to above, was made the type of the new genus *Bronnia*. The genera are, therefore, synonymous, *Fouquieria* taking presence on account of the priority of publication.

2. FOUQUIERIA FORMOSA H.B.K. Nov. Gen. & Sp. **6**: 83. *pl. 527*. 1823.

Echeveria spicata Mocino & Sessé; DC. Prod. **3**: 349. 1828.

Philetaeria horrida Liebm. Vidensk. Selsk. Skr. V. **2**: 283. *pl.* 1851.

A branching shrub 2–3 m. tall, with a racemose inflorescence and large red flowers. Leaves on the new growth 3–4 cm. long, petioled; petiole about one half as long as the blade; blade 2–2.5 cm. long, 10–13 mm. wide, elliptic, apiculate, cuneate at the base: fascicled leaves in the axils of the spines smaller, sessile or nearly so, elliptic, 1.5–3 cm. long, usually less than 1 cm. wide, rounded at the apex, cuneate at the base: spike 1.5 dm. long or less, the flowers ascending: sepals red, 8–11 mm. long, broadly oval to orbicular: corolla red, the tube a little curved, cylindric, about 2 cm. long and about 7 mm. in diameter, the lobes spreading or reflexed, orbicular, abruptly acuminate, 6–8 mm. long: stamens exserted, unequal in length, sometimes twice as long as the corolla, the filaments a little broadened and compressed below, glabrous at the base, then pubescent for a short distance with long ascending hairs, the remainder of the filament glabrous, the anthers oblong-ovate, cordate at the base, acute at the apex, 5–6 mm. long: styles united except at the apex, shorter than the longest stamens, the divisions 3–5 mm. long.

Southern Mexico.

Specimens examined. — Jalisco: Guadalajara, *Pringle 2420*, 1889. Puebla: Tehuacan, *Pringle 6296*, 1895. Mexico: Chiquihuite, *Bourgeau 1120*, 1865–6.

This is quite distinct from any of the other species in its spicate inflorescence. The exact locality from which it was originally secured is not indicated. The specimens cited above would point to the southern part of Mexico as its home. *Philetaeria horrida* Liebm. was obtained in valleys at an altitude of 1500–1800 meters,

in the district of Tehuacan, State of Pueblo, from which place Pringle also secured the same plant many years later. Liebmann's excellent plate and description leave no doubt as to the identity of his plant with the one of H.B.K.

3. **Fouquieria Macdougalii** sp. nov.

A much-branched tree, reaching a height of 7 m. and a trunk diameter of 1–2 dm., with bark yellowish green on the trunk and brown on the spiny branches, the spines 1–2 cm. long, and terminal slender panicles of few bright red flowers. Leaves on the new growth 6–8 cm. long, petioled; blade 3.5–4 cm. long and about 1 cm. wide, acute at the apex, and rather abruptly narrowed into a petiole of the same length: fascicled leaves in the axils of the spines gradually narrowed into a sessile base, 3.5–4 cm. long and about 1 cm. wide: panicle slender, 7–10 cm. long, its delicate simple branches widely spreading, the lower ones 3–4 cm. long and bearing 2–4 flowers on slender pedicels which are 1–2 cm. in length and abruptly thickened at the apex: flowers few: sepals broadly oval, about 6 mm. long, the outer two acute, the inner three rounded and apiculate at the apex: corolla about 2.5 cm. long, the tube cylindric, 3–4 mm. in diameter, the lobes broadly ovate, erect, acute, about 5 mm. long: stamens 10, exserted, the filaments red above, white below, broader and dorsally compressed near the base, the interior surface of this compressed portion glabrous, the exterior surface pubescent with long stout hairs which gradually increase in length upward and extend but a short distance on the rounded part of the filament which is glabrous to the summit, the anthers 2–3 mm. long: styles exceeding the stamens, united almost to apex: capsule about 2 cm. long.

Type specimen from living plants, collected at Torres, Mexico, in 1902, by MacDougal, no. 28, which flowered in the conservatories of the New York Botanical Garden in June, 1903.

Sonora and Sinaloa.

Specimens examined. — Sonora: Rayon, *Thurber 952*, 1851; Torres, *MacDougal 28*, 1902; Alamos, *Palmer 306*, 1890; Granados, *Hartman 226*, 1890. Sinaloa: Culiacan, *Palmer 1804*, 1891.

This plant was first secured by Thurber at Rayon, about eighty miles north of the place where it was recently obtained by Dr. MacDougal. Thurber's plant was distributed as *F. spinosa*, from which it differs materially. It is evidently, however, the

plant referred to under that name in the preface to Gray's Plantae Novae Thurberianae (Mem. Am. Acad. Arts & Sci. II. **5**: 303). His description of this tree agrees with a photograph of one made by Dr. MacDougal. The trunk arises from the ground for two or three feet, and then divides into crooked branches, the ultimate divisions of which are pendulous.

4. **Fouquieria peninsularis** sp. nov.

Bronnia spinosa Benth. Voy. Sulph. 16. 1844. Not H.B.K. 1823.

A shrub 2–3 m. tall, with a conic panicle and red flowers. Leaves on the new growth 5–6 cm. long, petioled: petiole about 3 cm. long, about as long as the blade: panicle conic, 1.5 dm. long or less, its branches ascending, stout, the lower ones sometimes 4–6 cm. long and usually divided, bearing 2–4 flowers on the ultimate divisions in a rather crowded manner, on short stout pedicels usually less than 5 mm. long: sepals orbicular or nearly so, 5–6 mm. long, apiculate, reddish: corolla red, the tube slightly if at all curved, about 1.5 cm. long and 5 mm. in diameter, the lobes erect or nearly so, orbicular, acute, 5–6 mm. long: stamens exserted, unequal in length, the filaments broadened and compressed at the base, the inner surface of the compressed portion glabrous, the outer surface pubescent with long ascending hairs, the remainder of the filament glabrous, the anthers 3–4 mm. long: styles united except at the apex: capsule fully 2 cm. long.

Lower California and western Sonora.

Specimens examined. — Lower California: La Paz, *Maj. W. Rich*, Dec. 11, 1847 (type); Turtle Bay, *Anthony 144*, July–Oct., 1896; San Bartolome Bay, *Chas. F. Pond*, March, 1889; Calmalli, *Purpus 141a*, Jan.–March, 1898; Cape San Lucas, *Xantus 38*. Sonora: Guaymas, *Palmer 266*, 1890.

Related to *F. splendens*, but distinguished by the absence of the appendage at the base of the filaments, the more open panicle and the larger capsule.

I have ventured to identify the *Bronnia spinosa* of the Voyage of the Sulphur with this plant, as I have seen material from Cape San Lucas, the place from which that plant was secured. The type of this species was secured at La Paz, only about ninety miles north of Cape San Lucas. Bentham describes the filaments as glabrous, a condition unknown in the genus so far as I have ex-

amined it. Otherwise his description agrees well with this plant, and as the filaments are pubescent only toward the base the pubescence might readily be overlooked.

5. FOUQUIERIA SPLENDENS Engelm. in Wisl. Mem. Tour Mex. 98. 1848.

Fouquieria spinosa Torr. in Emory, Mil. Reconn. 147, *pl. 8.* 1848. Not H.B.K. 1820.

A branching shrub, the long slender branches arising from near the base, sometimes to a height of 4–6 m., with a narrow paniculate inflorescence and red flowers. Leaves of the new growth 3–5 cm. long, petioled; petiole about one half as long as the blade; blade 2–3 cm. long, 5–7 mm. wide, narrowly elliptic to oblanceolate, acute at the apex, narrowed at the base: fascicled leaves 1–1.5 cm. long, 5–8 mm. wide, narrowly obovate to obcordate: panicles narrow, solitary or several at the apex of the stem, 5–20 cm. long, the branches usually short and with the few flowers crowded: sepals broadly oval to nearly orbicular, 5–8 mm. long, obtuse or rounded at the apex: corolla red, the tube straight, 15 18 mm. long, gradually a little enlarged toward the apex, 4–5 mm. in diameter at the middle, the lobes spreading and recurved or enrolled, broadly oval to orbicular, obtuse at the apex or sometimes apiculate, 4–5 mm. long: stamens exserted, unequal in length, the filaments broadened and dorsally compressed at the base, the compressed portion running out laterally into a scale-like appendage which is pubescent on the upper surface and 0.5–1 mm. long, the inner surface of this broadened portion glabrous, the outer surface pubescent with long stout hairs, the remainder of the filament glabrous; anthers about 4 mm. long, oblong, abruptly acute, cordate at the base: styles more or less united, only toward the base, or nearly to the apex: capsule 1–1.8 cm. long.

Western Texas and northern Mexico to southern California and northern Lower California.

Specimens examined.—Texas: El Paso, *G. R. Vasey*, May, 1881, and *L. H. Dewey*, June 15, 1891; *Wright 228*, October, 1849. Mexico: Chihuahua and Sonora, *Thurber 401*, May, 1851; Coahuila, *Palmer 80*, 1880; San Pablo, *Gregg*, April 30, 1847. New Mexico: Grant Co., *Mearns 46*, 1892; Little Mt., near Las Cruces, *Wooton*, May and July, 1893. Arizona: Tucson, *Toumey*, April 20, 1894; Tucson Mts., *Toumey 465*, 1892; Willow Springs, *Jones*, May 29, 1890; Gila Valley, *Rothrock 319*; foothills, *Prin-*

gle, April 6, 1891; San Francisco Mts., *Wheeler*, 1872; Squaw Peak, *Mearns 173*, May 6, 1887; Ft. Huachuca, *Wilcox*, June 1, 1892, and *106*, 1894. California: *Emory*, November 29, 1846; *Frémont*, 1849; The Needles, *Jones 3831*, May 6, 1884; southern California, *Parish*. Lower California: Rosario, *Orcutt 1354*, May 1, 1886.

This species has a much more extended range than any of the others and is the only one found within the confines of the United States. It may be distinguished at once from narrow-panicled forms of *F. peninsularis* by the prominent appendage near the base of the filaments and by the larger capsule. It has a number of common names, among them being Ocotillo, Coach-whip, Vine-cactus, and Jacob's Staff.

6. **Fouquieria campanulata** sp. nov.

A woody plant with narrow panicle and red campanulate flowers. Leaves on the new growth 3–4 cm. long, petioled; petiole less than one half as long as the blade, which is 2–3 cm. long and 4–5 mm. wide, narrowly oblong or oblanceolate: fascicled leaves 2–3 cm. long, 3–6 mm. wide, oblanceolate, acutish, narrowed to the sessile base: inflorescence a narrow panicle 1.5 dm. long or less, the branches short and spreading and the flowers on them crowded: sepals broadly oval to orbicular, 5–6 cm. long, pale: corolla, from the tip of the recurved spreading lobes to the base of the tube, 12–14 mm. long, campanulate, the tube, which is about as long as the lobes, 3 mm. broad at the base, enlarging to the summit where it is 5–6 mm. in diameter: stamens exserted, unequal in length, the filaments broadened and compressed at the base, the broadened portion running out into a spreading or reflexed scale-like appendage which is pubescent on the upper surface and about 0.75 mm. long, the inner surface of the compressed portion glabrous, the outer surface pubescent with long hairs toward the summit, the remainder of the filament glabrous, anthers ovate-elliptic, cordate at the base, acute at the apex.

Durango.

Specimens examined.—Santiago Papasquiaro, *Palmer 87*, 1896.

An exception in the genus in having campanulate flowers. This and *F. splendens* are the only species which have well-developed appendages toward the base of the filaments.

2. IDRIA Kellogg, Hesperian, **4**: 101, *pl.* 1860

Trees with a stout columnar trunk from which arise short spreading spiny branches. Inflorescence paniculate, arising from

the apex of the trunk, the flowers rather crowded and almost sessile upon the ultimate divisions of the panicle. Corolla yellow, campanulate, the lobes orbicular, concave, incurved, shorter than the tube. Stamens 10, adnate at the very base to the corolla-tube: filaments pubescent below. Styles short, thick, united their entire length, but little longer than the ovary, forming a stout 3-angled body, the angles rounded.

Species one; Lower California.

1. IDRIA COLUMNARIS Kellogg, Hesperian, **4**: 101. *pl.* 1860.

Fouquiera columnaris Kellogg; Curran, Bull. Cal. Acad. Sci. **1**: 133. *pl.* 1885.

Fouquiera gigantea Orcutt, West Am. Sci. **2**: 48. 1886.

A tall tree with a tapering trunk up to 3–4 m. in height or even taller, and a diameter at the base of about 3 dm. or more, from which arise the short spreading spiny and leafy branches. Leaves of the new growth unknown: fascicled leaves 1.5–2 cm. long and 5–8 mm. wide, oblanceolate to narrowly obovate: panicles 3 4 dm. long, flowers rather crowded and nearly sessile upon the ultimate divisions: flowers, including the exserted stamens, 12–14 mm. long: sepals orbicular, about 4 mm. long: corolla yellow, 6–7 mm. long: stamens exserted, the filaments pubescent below, the anthers about 3 mm. long: styles about 2 mm. long, thick.

Lower California.

Specimens examined. — Rosalia Bay, *Anthony 120*, July to October, 1896.

Originally collected by Dr. Veatch near the Bay of Sebastian Viscaino, on the mainland east of Cedros Island. The tree was described by Dr. Kellogg as spineless, but this must have been an error, as others who have visited the same region remark upon the long spines which are found on the short branches arising from the trunk. Moreover, a specimen in the herbarium of the New York Botanical Garden, collected by Anthony at Rosalia Bay, but a few miles north of the original station, shows these spine-bearing branches, the spines being similar to those occurring in the other members of this family. Dr. Kellogg describes the trunk as undivided, while Orcutt, in the description of his *Fouquiera gigantea*, states that the trunk branches above the middle, sending up a few simple branches to nearly the height of the main stem. Brandegee, in his account of a collection of plants

made in Lower California in 1889 (Proc. Cal. Acad. Sci. II. 2: 132, 133), also refers to this branched condition, but considers this state as exceptional and due to accident or injury. Both Brandegee and Orcutt claim the trunk attains a height of fifty feet or more. Brandegee remarks that the old capsules are 8–10 mm. long and sessile in the panicle, and that the trunks are 6–9 dm. in diameter at the base, gradually tapering upward into a pointed apex, so that the general shape is much like that of an inverted carrot.

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